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REPORT OF PINE BEETLE SURVEYS

ON THE

MALHEUR NATIONAL FOREST

SEASON OF 1940

By

W. J. Buckhorn, Senior Scientific Aide  
Bureau of Entomology and Plant Quarantine  
Forest Insect Investigations

May 7, 1941

Forest Insect Laboratory,  
445 U. S. Court House,  
Portland, Oregon.

SUBJECT-

INDEX No.-

REPORT OF PINE BEETLE SURVEYS  
ON THE  
MALHEUR NATIONAL FOREST  
SEASON OF 1940

Approved by

*F. P. Keen*

F. P. Keen  
Senior Entomologist

Submitted by

*W. J. Buckhorn*

W. J. Buckhorn  
Senior Scientific Aide

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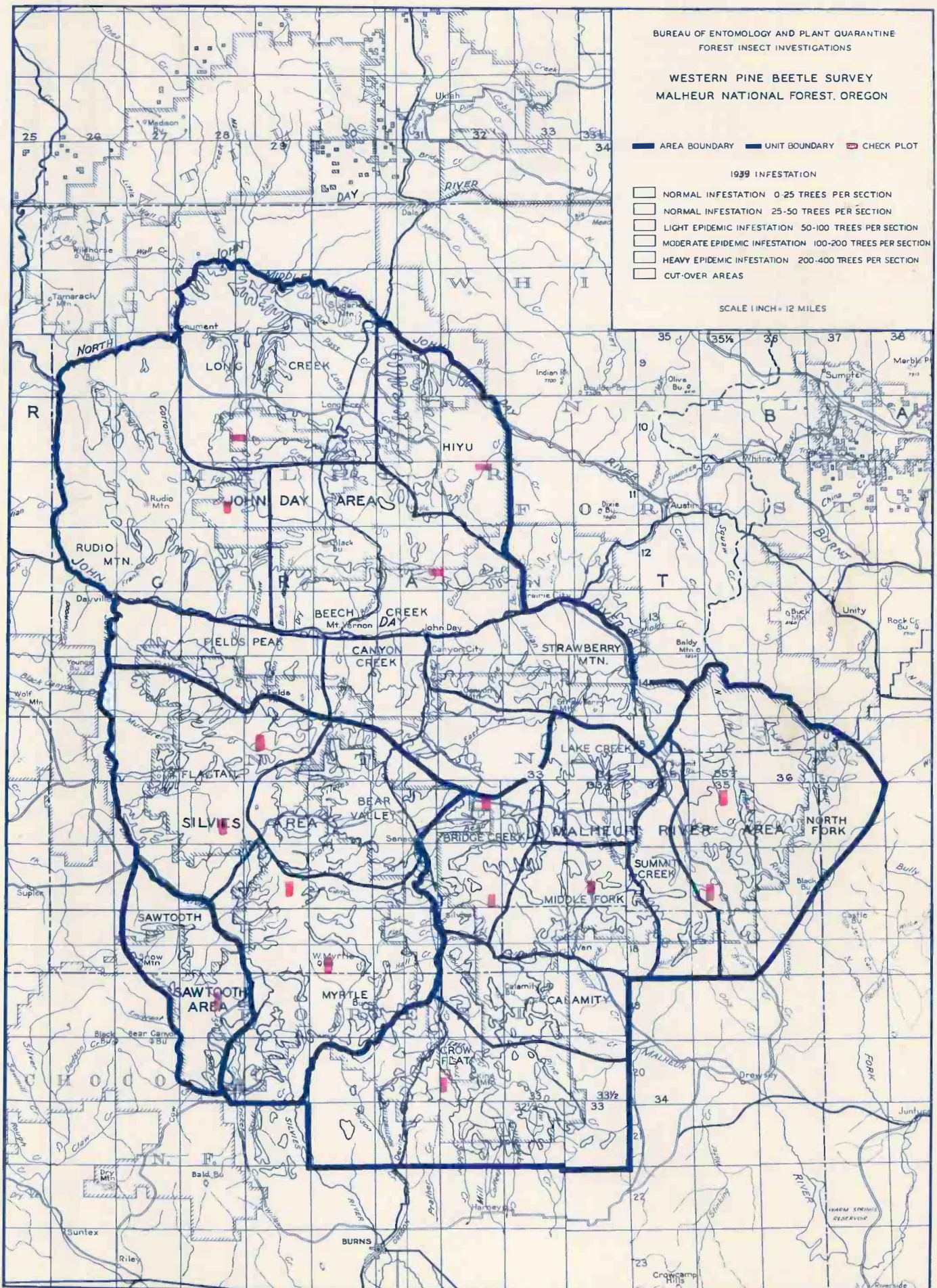
WESTERN PINE BEETLE SURVEY  
MALHEUR NATIONAL FOREST, OREGON

AREA BOUNDARY UNIT BOUNDARY CHECK PLOT

1939 INFESTATION

- NORMAL INFESTATION 0-25 TREES PER SECTION
- NORMAL INFESTATION 25-50 TREES PER SECTION
- LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
- MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
- HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
- CUT-OVER AREAS

SCALE 1 INCH = 12 MILES



## TABLE OF CONTENTS

	Page
Introduction-----	1
Past Losses-----	1
The Survey of 1940-----	2
Recent Loss Trends on Check Plots-----	2
General Infestation Conditions 1939-40-----	2
Other Insects-----	3
Control Work Fall of 1940-----	3
Summary-----	4

## TABLES AND MAPS

Table No. 1. Description of Check Plots-----	6
Table No. 2. Summary of Ponderosa Pine Losses on Check Plots Survey of 1940-----	7
Table No. 3. Recent Infestation Trends on Check Plots Volume Basis-----	8
Table No. 4. Estimated Ponderosa Pine Losses for 1939-----	9
Map No. 1. Location of Areas, Units, and Check Plots-----	Frontispiece
Map No. 2. Status of 1939 Infestation-----	10

## Introduction

The tenth annual forest insect survey of the ponderosa pine stands within and adjacent to the Malheur National Forest was conducted during the period September 6 to 25, 1940. As in the past, this survey was conducted cooperatively by the Forest Service and the Bureau of Entomology and Plant Quarantine.

The purpose of the survey was threefold: (1) to follow the infestation trends of the western pine beetle (Dendroctonus brevicornis Lec.) and other less important bark beetles, (2) to ascertain the need of artificial control measures, and (3) to determine the type of tree and areas most susceptible to beetle attack and warranting first consideration in timber management plans.

The Forest Service employed a crew of three field aides, F. E. Kimney (crew leader), G. A. Beckim, and G. W. Summerside, to carry on the intensive field work, which consisted of making a 100% cruise of current beetle losses on 15 permanent 320-acre check plots. A description of these plots will be found in Table No. 1, and their locations on the forest shown on Map No. 1. The writer gave the crew technical supervision and also made an extensive observational reconnaissance of some 1,018,000 acres of ponderosa pine type within or adjacent to the forest. From these combined surveys, estimates of the insect-caused losses during 1939 were prepared for the forest as a whole.

## Past Losses

Aided by the cumulative effects of drought conditions which greatly lowered the resistance of the pine stands, a quiescent infestation of the western pine beetle that began building up during 1930 quickly assumed epidemic proportions over much of the forest. The epidemic, which reached its greatest intensity during 1932, was halted during the winter of 1932-33 by extreme subzero temperatures that caused widespread mortality to overwintering broods of the western pine beetle.

The infestation then began to decline. Subsequent cold periods that also caused some brood mortality, coupled with an improvement in tree growth, aided in reducing beetle losses to a low point during 1936. In 1937 infestation began an upward trend that continued through 1938.

During the ten-year period 1931-40 losses on the 1,018,000 acres of pine type on the forest were estimated at some 611 million board feet of ponderosa pine, or 7.3 percent of the 1931 stand.

#### The Survey of 1940

The 1940 plot cruise completed the loss data for 1939 and gave preliminary information on the 1940 loss trend. These losses on the check plots are summarized in Table No. 2.

As less than 71 percent of the 1940 loss had developed by the time of survey, the probable total was estimated by employing an estimating factor developed from past surveys.

#### Recent Loss Trends on Check Plots

A comparison of loss trends on the check plots for the three-year period 1938-40 is presented in Table No. 3. These data show that the infestation over the forest as a whole continued the upward trend begun during 1937 through 1938. Then in 1939 the infestation declined slightly and remained more or less static during 1940. The average for all plots on the forest showed a loss of 98 board feet per acre in 1938, 92 board feet per acre in 1939, and a predicted loss of 92 board feet per acre for 1940.

While there was very little change in the average loss for all plots during these three years, the losses shifted between plots very considerably. In 1938, 12 out of the 15 plots showed a marked increase in infestation over that of 1937. Only 3 plots, two on the Malheur River area and one on the Snow Mountain area, showed a decline. In 1939, 7 plots showed an increase and 8 plots showed a decrease in losses. In 1940, 7 plots showed an increase and 8 showed decreases. The increases on two of the plots appeared to be due to logging disturbance in nearby areas.

#### General Infestation Conditions 1939-40

During 1939 beetle activity over the forest as a whole caused losses of ponderosa pine estimated at 51,350,000 board feet, an average of 51 board feet per acre or 0.63 percent of the stand. These estimated losses are presented by units and areas in Table No. 4, their intensity and distribution on the forest graphically shown on Map No. 2.

Not much change occurred in the general level of infestation over the forest as a whole during 1939-40 although local conditions were extremely varied.

On most of the John Day and Silvies areas, infestation declined except for two new centers of aggressive infestation. One of these, on the Hiyu unit, was a flare-up of recent origin, to which the disturbance created by recent logging operations undoubtedly contributed. This infestation should subside when normal environmental conditions become reestablished. The other center was found on adjacent portions of the Canyon Creek, Bridge Creek, and Bear Valley units. This infestation center has been building up for some time and recently assumed moderate epidemic proportions in both the virgin and 40-percent selectively logged stands.

Over most of the Malheur River area the infestation continued an upward trend during 1939-40. Increases occurred on the better sites at higher elevations as well as in the marginal stands.

Some increase occurred on the Snow Mountain area during 1939 but had begun to decline in 1940.

#### Other Insects

During the latter part of September the writer again visited the area on Rudio Mountain where an outbreak of Douglas fir tussock moth was in progress during 1937-38. This appeared to have vanished after the heavy defoliation of 1939, and no further signs of this insect could be found. Where the defoliation was not too severe many of the trees were putting on new foliage and appeared to be recovering.

Little or no insect activity was noted in other tree species over the forest.

#### Control Work Fall of 1940

During 1939-40 a moderate epidemic infestation developed in both virgin and 40 percent selectively logged stands on adjacent portions of Canyon Creek, Bridge Creek, and Bear Valley units, and in two small areas on the southwest of the latter unit.

Four check plots in the 40 percent selective logging area showed an average loss per section of 178 trees in 1939 and a predicted loss of 136 trees in 1940. Loss per section on the virgin plot amounted to 172 trees in 1939 and 222 during 1940.

In view of this critical situation, artificial control measures were believed necessary to assist natural agents in reducing losses to a more nominal figure. From the pine beetle survey the number of infested trees requiring treatment and the acreages involved were estimated as follows:

<u>Stand</u>	<u>Acrea</u>	<u>Secs.</u>	<u>Trees Per Sec.</u>	<u>No. of Trees</u>	<u>Bd. Ft. Per Tree</u>	<u>Total Volume</u>
40% Selectively Logged	17,280	27	70	1,880	500	940,000
Virgin	<u>17,920</u>	<u>23</u>	80	<u>2,240</u>	700	<u>1,568,000</u>
Totals	25,200	55		4,120		2,508,000

A control project was proposed to be carried on cooperatively by the Forest Service and the Edward Hines Lumber Company of Burns, Oregon. Under project plans the company was to salvage the infested trees on the selectively logged area and also on accessible portions of the virgin stand, and the Forest Service would use CCC labor to treat by the peel and burn method all trees inaccessible to salvage logging. All spotting of infested trees was to be done by Forest Service personnel.

Spotting on the project began during the second week of November 1940. Treating began the following week and salvage logging started during the first week of December.

More detailed information on the project will be found in the report by the writer entitled, "Progress Report on Bear Valley Control Project Malheur National Forest Fall of 1940" dated January 7, 1941.

#### Summary

The tenth annual pine beetle survey was conducted on the forest during the period September 6 to 25, 1940.

Plot data show that the infestation trend, which was upward through 1938, declined somewhat during 1939 and remained more or less static during 1940.

Local infestation conditions varied considerably during 1939-40. On the John Day and Silvies areas two new centers of moderate epidemic developed while pronounced declines occurred on other portions of these areas. The infestation on the Malheur River area continued to increase during this period. On the Snow Mountain area the infestation increased through 1939 but decreased considerably during 1940.

Control measures were recommended to reduce the moderate epidemic infestation that recently developed in both the virgin and 40 percent selectively logged stands on adjacent portions of Canyon Creek, Bridge Creek, and Bear Valley units. The work on this project was to be carried on cooperatively by the Forest Service and Edward Hires Lumber Company of Burns, Oregon.

The tussock infestation on Rudio Mountain was found to have subsided completely.

Little insect activity was noted affecting other tree species on the forest.

Table No. 1. Description of Check Plots

Areas and Units	Plot Name	Plot Location			Elevation	Type	Site	Pine	Pine Volume	Board Feet
		T.S.	R.E.	Sec.				Timbered Acres	as of Jan. 1, 1939	per Acre
<u>John Day</u>										
Long Creek	Long Creek	10	28	24S	4,650	20.5	4	320	2,939,150	9,200
Rudio Mountain	Rudio Mountain	11	28	26W	4,000	20.5	4	245	3,585,150	14,600
Hiyu	Hiyu	11	32	3S	3,800	20.5	4	320	2,511,450	7,800
Beech Creek	Beech Creek	12	31	25N	4,500	20.5	4	313	2,573,550	8,200
Area Total								1,198	11,609,300	9,600
<u>Silvies</u>										
Flagtail	Murderers Creek	15	29	17E	4,000	20.5	4	320	4,384,300	13,700
	Flagtail	16	28	26W	4,600	20.5	4	320	5,110,135	16,000
	Drum Spring	17	29	26W	5,970	20.5	4+	320	4,676,300	14,600
	West Kyrtille	18	30	32E	5,500	20.5	5	320	3,286,230	10,200
Area Total								1,280	17,456,965	13,600
<u>Snow Mountain</u>										
Sawtooth	Sawtooth	19	28	15E	5,500	20.5	4	320	5,059,300	15,800
<u>Malheur River</u>										
Bridge Creek	Marsden	16	32	14E	5,100	20.5	4+	320	4,622,450	14,400
	Bridge Creek	17	32	36W	5,500	20.5	4	320	5,050,750	15,800
Middle Fork	Mahogany Spring	17	33½	28E	4,000	20.5	4	320	3,808,800	11,900
North Fork	Crane Prairie	16	35	10W	5,500	20.5	4	320	8,532,300	26,700
Summit Creek	Summit Creek	17	35	29E	5,500	20.5	4	320	4,455,300	13,900
Crow Flat	Williams Ranch	20	32	30W	6,100	20.5	5	320	5,462,400	17,000
Area Total								1,920	31,932,000	16,600
Forest Total		15 Plots, 4,800 Acres						4,718	66,057,565	14,000

Table No. 2. Summary of Ponderosa Pine Losses on Check Plots  
Survey of 1940

Areas and Plots	1939 Loss						1940 Loss					
	First Marking		Total		First Marking		Estimating	Estimated Total				
	Date	Trees	Volume	Trees	Volume		Date	Trees	Volume	Factor	Trees	Volume
<u>John Day</u>												
Long Creek	9-7	1	50	9	4,330	:	9-24	7	2,810	70	10	6,800
Rudio Mountain	9-8	6	4,610	16	8,370	:	9-25	7	4,260	70.5	10	6,800
Hiyu	9-5	7	1,865	58	20,055	:	9-21	78	34,310	67	112	52,300
Beech Creek	9-6	59	46,665	101	69,025	:	9-23	62	38,700	69	90	51,800
Area Total		73	53,190	184	101,780	:		154	80,080		222	117,700
<u>Silvies</u>												
Murderers Creek	8-31	32	27,460	72	60,460	:	9-12	21	21,350	60	35	31,800
Flagtail	9-1	8	14,650	21	30,610	:	9-11	5	8,250	59	8	9,200
Drum Spring	8-30	3	5,850	8	9,050	:	9-14	15	9,858	61.5	24	23,400
West Myrtle	8-26	3	7,400	5	7,660	:	9-13	3	3,220	61	5	7,100
Area Total		46	55,360	106	107,780	:		44	42,678		72	71,500
<u>Snow Mountain</u>												
Sawtooth	8-25	45	34,585	56	40,665	:	9-15	24	12,680	62	39	26,200
<u>Malheur River</u>												
Marsden	8-24	43	28,890	86	48,100	:	9-6	62	36,380	55	110	62,900
Bridge Creek	8-22	11	12,980	36	34,960	:	9-9	14	12,420	58	24	22,600
Mahogany Spring	8-23	14	9,660	45	29,350	:	9-17	46	35,580	64	72	52,000
Crane Prairie	8-29	6	4,340	22	18,130	:	9-19	19	17,890	66	29	33,500
Summit Creek	8-28	2	4,215	10	12,765	:	9-18	9	8,650	65	14	15,500
Williams Ranch	8-21	44	17,510	81	31,610	:	9-10	42	17,380	58.5	72	30,500
Area Total		120	77,595	280	174,915	:		192	128,300		321	217,000
Forest Total		284	220,730	626	425,140	:		415	263,738		654	432,400

Table No. 3. Recent Infestation Trends on Check Plots  
Volume Basis

Year of Loss		1938					1939					1940 Probable Loss						
		Trees		Bd.Ft.		Ratio	Trees		Bd.Ft.		Ratio	Trees		Bd.Ft.		Ratio		
Area and Plot	Trees Killed	Volume Bd.Ft.	per Sec.	per Acre	% of 1938 to 1937	Stand	Trees Killed	Volume Bd.Ft.	per Sec.	per Acre	% of 1939 to 1938	Stand	Trees Killed	Volume Bd.Ft.	per Sec.	per Acre	% of 1940 to 1939	
John Day																		
Long Cr.	35	32020	70	100	1.07	2.90	9	4330	18	14	.08	.14	10	6800	20	21	.23	1.57
Rudio Mtn.	56	41270	146	169	1.23	1.25	16	8370	42	34	.21	.21	10	6800	26	28	.19	.81
Hiyu	50	32740	100	102	1.29	2.80	58	20055	116	64	.82	.61	112	52300	224	165	2.10	2.62
Beech Cr.	87	35775	178	116	1.35	1.02	101	69025	206	220	2.68	1.93	90	51800	184	165	2.00	.75
Total	228	141805	122	118	1.21	1.46	184	101780	98	85	.87	.71	222	117700	118	98	1.01	1.16
Silvies																		
Manderers																		
Creek	75	56570	150	177	1.27	1.26	72	60460	144	190	1.39	1.07	35	31800	70	97	.71	.52
Flagtail	46	43695	92	137	.85	1.53	21	30610	42	96	.60	.70	8	9200	16	29	.18	.30
Drum Spr.	22	24910	44	78	.53	1.16	8	9050	16	28	.19	.36	24	23400	48	73	.50	2.59
Myrtle	12	17570	24	55	.53	1.23	5	7660	10	24	.23	.44	5	7100	10	22	.22	.93
Total	155	143015	78	112	.81	1.31	106	107780	53	84	.62	.75	72	71500	46	56	.41	.65
Malheur River																		
Marsden	46	25945	92	81	.51	1.05	86	48100	172	150	1.04	1.86	111	62900	222	196	1.36	1.31
Bridge Cr.	38	35470	76	112	.70	1.05	36	34960	72	109	.68	.99	24	22600	48	71	.45	.65
Crane																		
Prairie	15	29040	30	90	.34	1.72	22	18130	44	57	.21	.63	29	33500	126	106	.39	1.85
Summit Cr.	10	8890	20	28	.20	2.04	10	12765	20	40	.29	1.43	14	15500	28	48	.35	1.22
Mahogany																		
Spr.	29	22040	58	69	.58	.50	45	29350	90	92	.77	1.33	72	52000	144	163	1.37	1.77
Williams																		
Ranch	62	29235	124	91	.54	.55	81	31610	162	99	.58	1.03	72	30500	144	95	.55	.97
Total	200	150620	67	78	.47	.91	280	174915	108	91	.55	1.16	321	217000	106	113	.68	1.24
Snow Mtn.																		
Sawtooth	35	24195	70	76	.47	.75	56	40665	112	127	.80	1.68	39	26200	78	82	.51	.65
Total	618	459635	71	98	.69	1.15	626	425140	85	92	.66	.93	654	432400	89	92	.65	1.02

Table No. 4. Estimated Ponderosa Pine Losses for 1939

Area and Units	Ponderosa Pine		Volume of Pine M.B.M. Jan. 1, 1939	Estimated 1939 Loss				
	Acreage			Trees	Volume M.B.M.	Trees per Sec.	Bd.Ft. per Acre	Percent of Stand
	Total	Virgin						
<b>John Day</b>								
Long Creek	19,460	16,220	204,500	1,180	800	39	41	.39
Rudio Mountain	81,686	81,686	540,200	4,600	3,400	36	42	.63
Hiyu	40,680	33,120	511,800	3,000	2,000	47	49	.39
Beech Creek	88,680	86,440	644,000	11,500	5,600	84	63	.87
Fields Peak	25,760	25,760	59,500	700	350	17	14	.59
Canyon Creek	62,880	58,880	304,700	8,300	5,000	83	81	1.64
Strawberry Mtn.	41,860	38,260	163,800	1,800	900	28	22	.53
Total	361,000	340,360	2,428,500	31,080	18,050	55	50	.74
<b>Silvies</b>								
Flagtail	96,784	96,784	643,800	8,500	6,700	56	69	1.05
Bear Valley	78,513	16,900	589,900	7,000	3,300	57	42	.57
Myrtle	114,703	114,703	933,200	6,300	5,000	35	44	.54
Total	290,000	228,387	2,166,900	21,800	15,000	46	52	.69
<b>Snow Mountain</b>								
Sawtooth	53,000	53,000	324,000	5,400	2,800	64	53	.86
<b>Malheur River</b>								
Lake Creek	31,500	31,500	318,700	500	370	10	12	.12
Sunsait Creek	32,140	32,140	459,900	780	700	14	22	.15
North Fork	73,880	73,880	944,100	2,280	2,050	18	28	.22
Bridge Creek	44,356	40,756	500,000	5,100	3,700	74	84	.74
Middle Fork	44,940	42,700	478,300	4,100	3,000	58	73	.63
Calamity	25,992	25,992	186,200	3,700	2,280	91	88	1.22
Crow Flat	61,192	48,162	430,500	6,800	3,300	45	54	.77
Total	313,990	295,130	3,317,700	23,260	15,500	47	50	.47
Forest Total	1,017,990	916,877	8,237,100	46,180	51,350	29	51	.63

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE  
FOREST INSECT INVESTIGATIONS

WESTERN PINE BEETLE SURVEY  
MALHEUR NATIONAL FOREST, OREGON

— AREA BOUNDARY — UNIT BOUNDARY □ CHECK PLOT

1939 INFESTATION

- NORMAL INFESTATION 0-25 TREES PER SECTION
- NORMAL INFESTATION 25-50 TREES PER SECTION
- LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
- MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
- HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
- CUT-OVER AREAS

□ CONTROL PLOTS

SCALE 1 INCH = 12 MILES

